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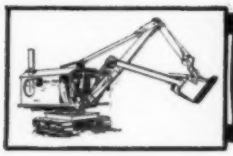
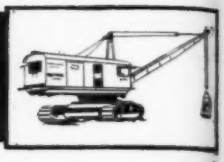
The EXCAVATING ENGINEER

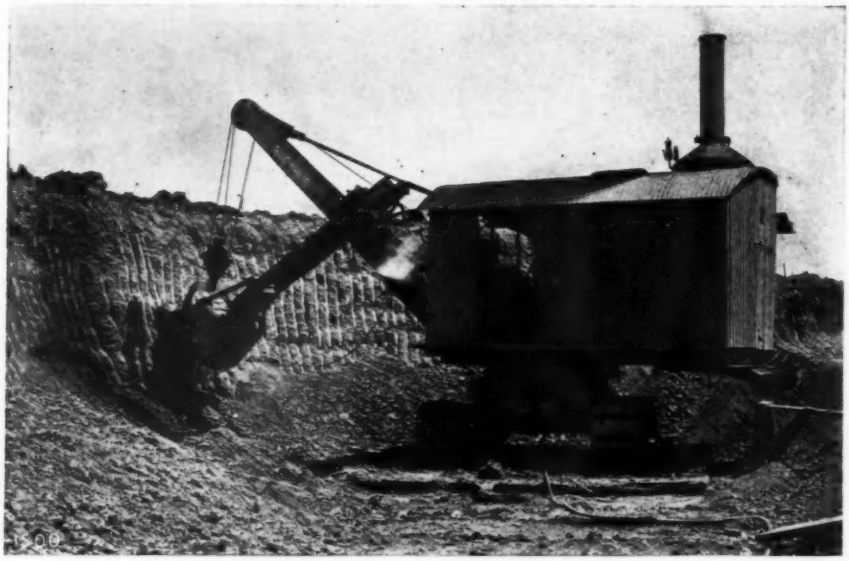
Vol. XV No. 8 AUGUST, 1921



BUCYRUS



In the Hardest Clay Pit Digging



Bucyrus Revolving Shovels are Making Good

When they show their teeth like this, it means that the digging is stiff. But notice how evenly this Bucyrus shovel goes through the stiff clay in a long sweeping cut mixing the different kinds of material in the bank. This means better brick at lower cost.

A shovel mounted on railroad wheels was used before the Bucyrus was put on this job. In the soft, wet pit the track was a continual source of trouble. The Bucyrus caterpillar mounting has eliminated all track labor and expenses and reduced operating costs in this brick plant.

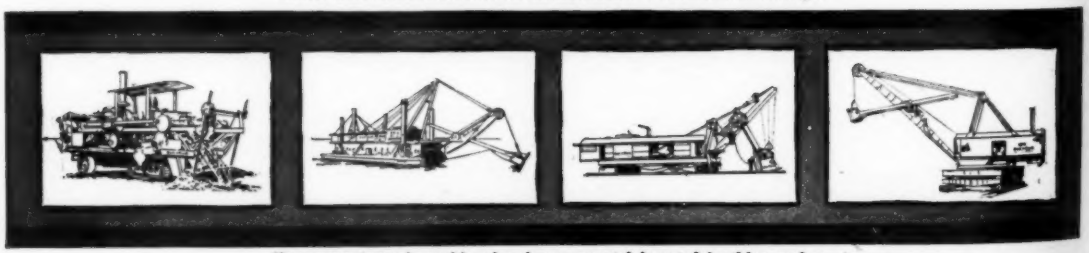
It will do the same for you.

Send for Bulletin C-S

BUCYRUS COMPANY

South Milwaukee, Wisconsin

Write Nearest Branch Office for Information. See List on Last Page.



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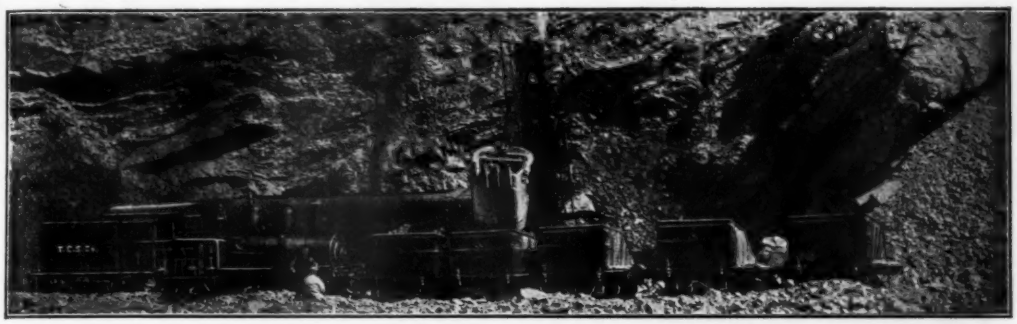

"SHAYS" SPOT CARS RAPIDLY AND ACCURATELY

SPOTTING LOSSES

The minutes lost in spotting with a rod engine add up.

Translated into money they mean unnecessary dollars and cents in daily operating costs.

Multi-cylinders and geared drive—every wheel is a driving wheel—enable Shay Geared Locomotives to spot quickly and accurately, saving time and money in the operation.

We know because we make both rod and Shay Locomotives.

Operators who use Shays know, too.

Lima Locomotive Works, Incorporated

Lima, Ohio **17 East 42nd Street, N. Y. City**

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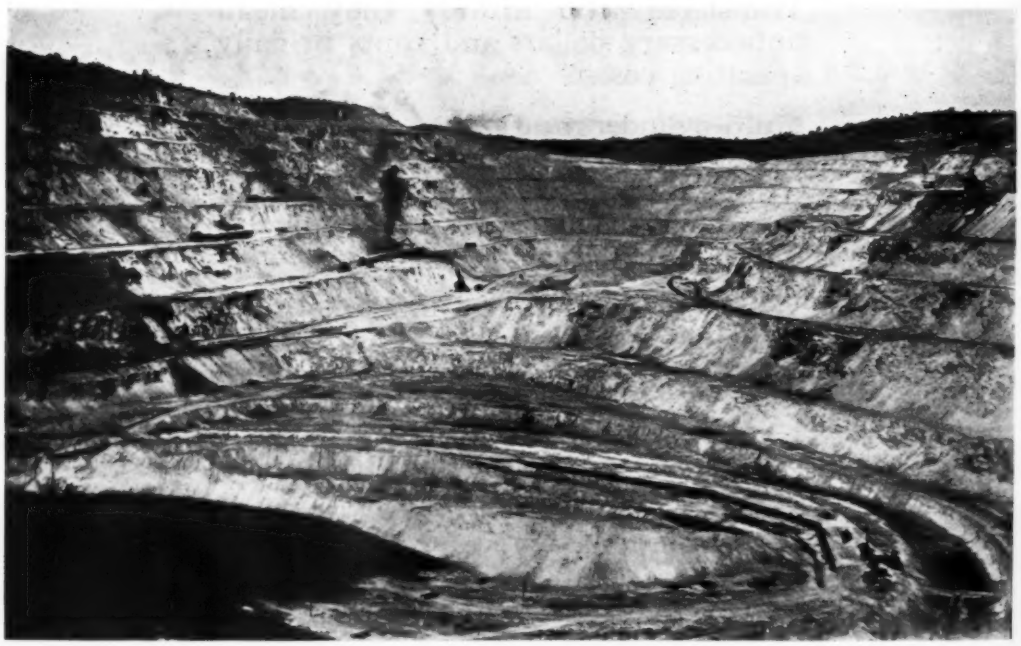
200,000 tons of rock was broken by this blast. Eight holes were loaded with 38,200 lbs. of black powder and 400 pounds of nitro-starch powder and fired simultaneously.



General View of Copper Flat, Showing the Bench Arrangement

The Excavating Engineer

Vol. 15 AUGUST 1921 No. 8

Steam Shovel Operations, Nevada Consolidated Copper Company

A description of the operations at Copper Flat where nine steam shovels are at work. A more detailed description of the characteristics of the deposit and the methods of mining pursued may be obtained from Arthur B. Parsons' excellent paper in the April 16 issue of Mining and Scientific Press. This article deals principally with the steam shovel methods.

Copper Flat

FAR up among the mountains of eastern Nevada, eight thousand feet above the sea, lies Copper Flat, the pit of the Nevada Consolidated Copper Company, one of the three greatest open-cut copper mines in the world.

In the pioneer days of the West, the great bonanza days, it was here to "Old Eureka" that miners of Virginia City came for their gold and silver. These years went down as perhaps the most romantic chapter in the history of the West. Then came the period of the decadence when the prestige of Nevada sank lower and lower as the fabulous dreams of mountains of precious metals gradually faded.

It was at this time that a story is told of a certain assayer who had picked up a peculiar looking rock the like of which had not been noticed before in that region. Although of half a mind to throw it away he decided to run it, more out of a feeling of curiosity than anything else. The resulting discovery eventually meant copper and the reconnaissance of Nevada.

For quite a while after this, "Old Eureka," what is now known as Copper Flat, was a gold and silver camp. They were aware of the presence of large quantities of copper but owing to the great distance from any railroad it was impossible to get it out. Furthermore the copper was low grade and hence there was a doubt as to the commercial success of mining it. Then came the railroad and next the introduction of the steam shovel and "Old Eureka" became Copper Flat.

Although this pit is small as compared with that of the Utah Copper Company at Bingham Canyon, Utah, it is nevertheless a most impressive sight. It lies in a pocket in the mountains consisting of nine working levels or benches, approximately 50 feet high by 50 feet wide.

Considerable prospect and development work

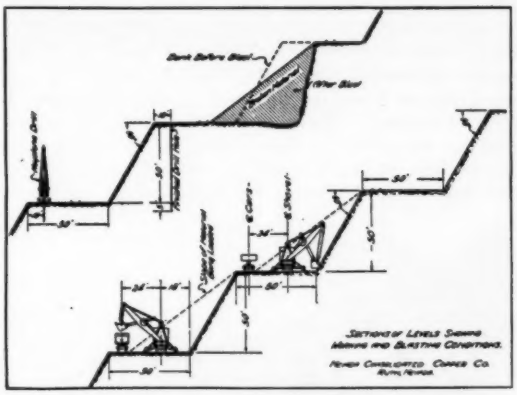


Diagram of Steam Shovel Operation in the Pit
From Mining and Scientific Press

was done previous to the year 1907 when the first steam shovels were put into operation. Work was first started on what is now Eureka Pit and by the Spring of 1910 this pit had become a bowl 160 feet deep, roughly oval in shape, with maximum dimensions of about 1000 by 2000 feet. Five Bucyrus steam shovels, a 95-C, three 95-Tons and a 70-Ton were loading 8000 tons of ore daily besides keeping stripping well in advance of the mining. Four levels were being worked on one side and three on the other. In 1909 work was started on a second pit known as the Liberty about 1500 feet west of the Eureka. In 1916 the intervening ground was removed resulting in one big pit now commonly known as Copper Flat.

Requirements for Steam Shovel Mining

As Arthur B. Parsons states in his paper on the Nevada Consolidated Copper Company, in the April 16, 1921, issue of the Mining & Scientific Press, the principal requirements of an orebody which is to be mined by steam shovels are an immense tonnage, large lateral extent, a thin

overburden and a comparative uniformity in the grade of the ore to be mined. Of lesser importance are, of course, the horizontal shape of the deposit, the character of the ore and of the overburden and the topography of the surrounding country. This last determines how advantageous the arrangement of approaches and dumps can be made. The deposit at Copper Flat adapts itself very favorably to these conditions. Here the thickness of the overlying zone of porphyry varied from 40 to 100 feet.

Drilling

The rock is for the most part soft but there are streaks of hard material mixed with the softer, thus making the stripping vary considerably in consistency. According to Mr. Parsons, blasting is done exclusively in 6 in. churn-drill holes, bored from the bench above. These holes are necessarily vertical; usually they are 55 ft. deep, thus extending about five feet below the grade (assuming a 50-ft. bank) to assure the breaking, at least to the level of the lower bench. This obviates difficulty with unbroken projections above the grade-level that interfere with the laying of track for the shovels and trains. The interval between holes varies with the

Loading Waste — Drills in Operation

character of the ground, but the average distance from the edge of the bank is 10 ft. and the space between holes is usually 35 feet.

Performance of Drills

The equipment comprises eleven No. 5 Keystone drills, with coal-fired boilers. This drill is strong, fast, and reliable; with a crew of two operators, that is, a runner and a tool-dresser, one 55-ft. hole per 8-hour shift is not an unusual average for experienced men. In prospect-drilling, after a depth of 150 or 200 ft. has been reached, progress is slower, of course; 15 ft. per 8-hour shift is a good record. At the collar of the hole an 8-in. steel casing, 6 or 8 ft. long, is sometimes inserted, where the ground has been shattered for a few feet by the previous blasting. The casing also serves to guide the bit until a

Looking Down into Eureka Pit

good start has been made; it may or may not be removed after the hole is complete. The average speed of the churn is from 50 to 60 drops per minute. A bailer made of 5-in. pipe-casing with a valve on the lower end is used to remove the sludge at intervals. Sometimes in hard ground it pays to bail with every foot of progress, but every two feet is generally often enough. In prospect or development holes the sludge is saved as a sample for assay.

Blasting

"Dobying" of the larger rock is reduced to a minimum in order not to delay shovel operations. All blasting is done by a special set of men in charge of the blasting-foreman. The first step is to "chamber" or "spring" the hole; that is, to make a pocket at the bottom to receive the blasting charge. This is done in three or more stages by detonating in succession increasingly large charges of low-freezing 40% powder; first 7 or 10 sticks, then a quarter of a box, three-quarters of a box, and, if necessary, two boxes are used. The success of the chambering can be determined by a simple contrivance consisting of a piece of bell-cord 60 ft. long, at the lower end of which is attached a cylindrical piece of wood of 4 in. diameter and 3 ft. long, centre-weighed with lead. This is used to sound the hole. Water serves for tamping; and, when the explosion takes place, a realistic imitation of a geyser ensues.

For the blasting-charge 300 to 700 lbs. of powder is used, the quantity depending upon the nature of the ground and the burden on the hole. Since 1919 two-fifths of the total quantity used has been ammonia or nitro-starch detonating powders, between which there is no particular preference: and three-fifths has been ordinary black blasting powder. Prior to that time a much larger proportion of the more expensive powder was used; but exhaustive comparative tests convinced the officials that the net cost of

breaking was considerably lessened by the increased use of black powder. Some of the heavier sulphide ore requires that the stronger explosive be used exclusively; moreover, a small amount of detonating powder (approximately 2% of the charge) is used in each hole to make the explosion not only certain but as effective as possible.

Steam Shovel Loading

Nine steam shovels are used, all Bucyrus; one 70-Ton, three 95-Ton, four 95-C's and a 100-C. The 95-C's have been fitted with 25-ft. dipper handles and 32-ft. booms in order to enable them to dig wider cuts whereby they can reduce the track shifting necessary. These longer booms also enable the shovel to keep away from the slides which occasionally happen in the softer stripping, thus enabling the loading track to be placed 52 ft. from the toe of the bank.

The crew actually engaged in the operation of the shovel consists of eight men, including one shovel engineer, one cranesman, one fireman, one coal-passer, and four pitmen. The specific duty of the pitmen is to take up the track behind and to re-lay it ahead of the shovel as progress is made in the removal of the bank. They are, however, available for any work in connection with the shovel operations.

During the first half of 1920 the average performance of all the shovels on ore was 306 tons per hour; the shovels on capping loaded 152.2 cu. yd. per hour during the same period. This includes the time consumed in moving the shovel and all lost time incidental to delays of the trains hauling the rock.

The Bench

A bench, 20 ft. wide after the blast, provides adequate room for the loading track at the proper distance from the shovel track when the shovels are equipped with booms and dipper sticks of the dimensions stated above. The shovel loads the material from the side between the bank and its own track, as well as immediately ahead, so that the advantage of the long boom in permitting a wide cut is apparent. The height of the bank, 50 ft., has several advantages: 50 to

Taking the Cap Off the Hill Dividing Eureka and Liberty Pits

Four Bucyrus Shovels at Work in the Earlier Development at Ely

55 ft. is an economical depth for churn-drilling; it is not so high that the broken rock is likely, when blasted, to bury the loading track on the shovel bench, nor so low that an unreasonably small quantity of ore is broken. A disadvantage of excessively high banks is the consequent decrease in the number of benches on which shovels can work. This under some circumstances might limit the possible rate of production. The accompanying sketch shows the ideal working conditions. The lines indicating the surface of the broken rock might preferably be more irregular to represent the true condition.

Disposal of Waste

More than thirty million cubic yards of overburden or capping has been removed or hauled

A 95-Ton Bucyrus Fitted with a Special Boom and Handle

to the four principal dumps. Thirty 20-yd. steel dump cars built in the company's shops at Ruth; twenty 18-yd. steel and thirty 12-yd. wooden Oliver cars are used. The capacity of the 18-yd. cars has been increased to 20 yds. and the 12-yd. cars to 18 yds. by raising the height of the sides. All are of standard gauge with air brakes but are dumped by hand.

The irregular topography of the neighboring terrain is well suited for affording convenient dumping space at various horizons, although the largest dump, the Keystone, is two miles distant, thereby involving a considerable haul, particularly when dumping is being done on the most distant side, for the dump itself has an area of several hundred acres. The tracks make a complete loop around the outer edge.

The Keystone dump has an available capacity at the present time of 17,000,000 cubic yards on ground owned by the company. The area beyond is unpatented land, valueless for mining purposes, and accordingly it will be possible to enlarge the dump to any extent necessary. The Stillwater, Puritan, and Sunshine dumps will provide for 12,000,000 additional cubic yards.

"Railroading" plays an important part in the pit operations. The mining company has 19.53 miles of standard gauge track in the shovel pit area, and 8.95 miles additional is comprised in approaches to the pit, sidetracks in the assembly yard, and the miscellaneous tracks at Ruth. The maximum grade of the tracks is 4%, this being found near the mouth of the pit, where the tracks from the different benches switch toward the assembly yard. At least 85% of the track is on a grade of less than 2%.

Transportation of the Ore

The ore is loaded by the shovels directly into 50-ton gable bottomed steel cars. Tracks for these cars and the 20-yd. waste cars are required on each bench in the pit.

On September 1, 1920, a trackage rental agreement was entered into between the mining company and the Nevada Northern Railway Company whereby the former took over the operation of the ore trains to McGill. This transaction included the purchase from the railroad company of eight locomotives, each with a weight of 170,000 lbs. on the drivers, and 250 sixty-ton ore cars of the Ingoldsby type. This change is expected to permit better co-ordination in haulage, with still more economical production.

Other Equipment

The Nevada Consolidated Company operates 16 locomotives, at Ruth, as follows:

Five	Class 337 Baldwin	65 tons
Seven	Class 336 American	48 tons
Two	Class 500 Baldwin	82 tons
One	Class 301 American	40 tons
One	Class 600 Schenectady	75 tons

All are of the "saddle-tank" type without tenders, except the last one, which is an ordinary switch engine.

Among other items of heavy equipment are a steam crane, a "wash-out," or repair car, and a Jordan spreader. The crane is of 30-ton capacity with a 44-ft. boom. It is used for unloading coal into stock piles and for transferring it, and for cleaning track when covered by heavy blasting. For this work a clamshell bucket of two-yard capacity is used. Another purpose that the crane serves to good advantage is the loading of churn-drills on a standard flat car for transfer from one bench to another. A suitable sling is prepared and the churn-drill is lifted bodily and placed on the car; the same method is used in unloading at the point where the new hole is to be drilled.

The crane is also used for moving track in the pit. After each cut the track, upon which the trains of ore cars run, must be shifted closer to the new bank. This is done by means of the crane operating from the bench next above. A sling, made with hooks on each end of a 40-ft. cable, engages a portion of the track. Fastened to the loop of the sling is a pulling line operated

directly from the drum of the crane. Successive lengths of track are dragged laterally a few feet at a time, the crane moving under its own power to maintain the proper direction of pull. In this manner the track is gradually worked to its new position. As much as 1500 ft. has been shifted in six hours with a force of four laborers and the crew operating the crane.

The "washout" car is an old box car fitted with an acetylene welding outfit, a power drill press, a 15 H. P. steam boiler, a small steam pump, a supply of hose and pipe, sundry jacks and chain blocks, and a large assortment of hand tools. The original purpose of the car was to enable the convenient washing of the boilers of the shovels as they stood in position. The plan was elaborated, and now all sorts of minor repairs to the shovels, churn drills, and even cars, are done expeditiously, a large proportion on equipment that previously was hauled to the shop. Repeated trips back and forth are thereby avoided.

Operating Data

The following data on the efficiency of operations during the first half of 1920 are based on an average output of approximately 6000 tons per day, and are fairly representative of what can be done. It should be noted that the unit used with respect to mining is the "ton of ore"; with stripping it is the "cubic yard of waste."

Mining

Tons of ore mined	1,028,592.0
Shovel shifts	428.6
Tons of ore per shovel hour	300.0
Tons of coal used on shovels	814.0
Tons of shovel coal per ton of ore	0.00087
Pounds of powder per 1000 tons of ore	259.41
Locomotive shifts	920.7
Tons of ore per locomotive hour	139.6
Tons of coal used on locomotives	3,126.12
Tons of locomotive coal per ton of ore	0.00304

Stripping

Yards of waste moved	1,191,246.0
Shovel shifts	978.29
Yards of waste per shovel hour	152.2
Tons of coal used on shovels	2,193.1
Tons of shovel coal per yard of waste	0.00184
Pounds of powder per 1000 yd. of waste	428.58
Locomotive shifts	2,174.88
Yards of coal used on locomotives	68.47
Tons of coal used on locomotives	7,495.06
Tons locomotive coal per yard of waste	0.00629

A Few Will Remember

By Edgar Young

in Adventure

Mr. Young is a veteran of the army who "put across" the "Big Ditch." His story is a vivid portrayal of the spirit which fired that splendid army of American workers. The reader's attention is called to the editorial under this caption on page 267 of this number, wherein we quote from Mr. Young's letter explaining the facts on which the story was based, and the circumstances pertaining to his own connection therewith.

I STOOD on the deck of a steamer making its way through Culebra Cut. Everything was changed. Nothing was the same. A second growth of jungle had sprung up. Grass was growing from the water-line to the hilltops. Herds of acclimatized Colombian cattle were grazing on the sides of Culebra.

Passengers lounged in deck-chairs idly scanning what they supposed were natural slopes of the country. A few stood at the rails chatting good-naturedly. Already they were beginning to wonder what would be of interest at the ports of the West Coast. Yet we were passing through the Culebra Cut, the nine-mile gash through a chain of mountains, the man-made canyon where we had battered and battered and dug and dug to weld two oceans into one. Culebra, trier of souls, red with the blood of men!

They are pasturing cattle on the sides of Culebra. It would have been scant picking eight years ago. Then the walls were bare and a horde of men swarmed sides and bottom of the big cut. I had to shut my eyes before I could see it as it was then. The roaring steam-shovels, belching smoke and steam, the racing locomotives dragging long trains of Lidgerwoods heaped high with red and blue clay, the maze of tracks on every spare foot of space along the floor and along the sides of the cut, the chugging Star-drills making holes for the noon-day bombardment, the channelers thumping up and down their short runways, the locomotive cranes with greedy clamshell or orange-peel buckets biting into the earth, the swinging stiff-legs, the screaming dinkys, the long-boomed track-shifters, the swarming gangs of white and yellow and black men from all countries on the earth's face.

An army of men had fought Culebra. Day by day they had gone out to give battle. And day by day Culebra gave answer. The walls caved in and great cracks in the earth extended back into the hills for miles, the bottom belched up from the weight of earth on the sides, overturning steam-shovels and disrupting tracks; slides came down. Cucuracha dropped four million yards into the cut in one day over and above her regular schedule. And she was but one of many. An unknown bed of mineral was dug into,

which took fire at exposure to the air and smoldered like a volcano for weeks until it was dug up bodily and hauled from the cut.

And Culebra killed and maimed and crippled many men. One day eighty were buried under a bank that caved in. Another day fifty were killed in a premature explosion. She took legs and arms, feet, hands and would have taken more lives and maimed more men had it not been for the best surgeons in the World who averaged more than thirty operations a day for months at a stretch in the operating ward at Ancon. Culebra—snake as your name implies; monster!

Men lost their grip of things and went to hell fighting against Culebra Cut. Men turned tail and fled, spreading the word that it could not be done. Men were made into gamblers, liars, thieves and murderers on account of Culebra Cut. It tried their souls. It gave them tests they never would have had to meet otherwise.

We were passing along the side of Gold Hill. How meaningless to the well-mannered folk who lounged the deck. Gold Hill! Gold Hill, the defiant! Gold Hill, the inscrutable! Gold Hill, the unconquerable! Gold Hill, highest peak of the mountain-chain!

Here had been Culebra's fort. Here she had let loose roaring avalanches of mud and stone. Here she had put more dirt in the canal in a day than we could dig out in a year. Here she had bitten deep into the ranks of the Yankee men, the sweating blacks, the allied horde that swarmed to give battle to this unchained giant and devil, Gold Hill.

We were floating over the exact spot where Jim Hall's shovel had worked the day before Gamboa dike was blown up and the water turned in. Jim Hall! I could have screamed it to my fellow passengers. Jim Hall's shovel made her last cut right back there. Jim Hall's shovel, the battered old Bucyrus. They meant much to me. And Jim Hall's heart, the heart of an overalls-clad private in the ranks. Of this big heart I shall have more to say.

I couldn't say just how long this shovel-runner had been on the Zone when I first arrived. That he had been there a long time I knew from the gaunt look of his hollow face, the sag of his figure, the melancholy stare of his pale blue eyes. There wasn't an ounce of strength visible in his face. His chin sloped abruptly, his sparse gray mustache drooped downward over a sagging lower lip. He was plainly a man who had missed too many boats back to the U. S. A. And this was in 1907.

I knew from the first time I laid eyes on him that he was hard hit by the sun. I wouldn't have given him a month to remain. Bigger, stronger, healthier men were going down and out by dozens. Shut off from the breeze down there under Gold Hill it was hot. One day at noon down there it registered one hundred and twenty-eight. And at

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The 95-Ton Bucyrus Shovels about to Complete the First Cut on the Final Level of the Panama Canal

Colon it was only ninety-four. That was in the shade. The Lord Himself only knows how hot it was on the same day on the deck of a Bucyrus with a piece of corrugated iron overhead and a red-hot boiler close beside. They packed them out that day on stretchers and they threw water on them where they staggered in circles and fell.

Other days the water poured from the sky. One year the record was a hundred and forty-four inches. And it only rained part of the time. It did not come down in drops nor sheets. It came down by pailsful, downpours, avalanches of water hurled from the heavens with force enough to knock a man to his knees at times.

I didn't stick around very long myself the first time. I did a hitch of about a year. It wasn't nearly so healthy on the Zone then as it is now. Nor it wasn't so tame either. Colon was a mud-hole with shacks standing about through it on stilts. They had no sewerage. Underneath the houses alligators and reptiles of all sizes and shapes squirmed through the black mud by day and night.

They hadn't got the Zone very well sanitated then, either. The impossible was not then an accomplished fact. Mosquitoes flew in clouds. There were gnats, bats, bugs, insects, great poisonous ants, snakes, lice—hell's brood to bite and sting—blood-sucking vampires and the sun.

This last was the worst. Not the heat but the hidden rays, the ultra-violet, the thing that takes hold of a man's soul, that clutches and burns up the nerves' very protoplasm, that causes men to spring up from deep slumber and scream with horror at a noise as slight as the dropping of a pin. This I know and from no man's hearsay do I know it.

I craned Jim Hall's shovel in 1907. Perched high on the side of the throbbing boom, underneath a piece of corrugated iron, butterfly throttle in left hand, dumping rope in right, *swoop,* the big five-yard dipper bit into the slate-hard clay. *Chow; chow! Chuff; chuff; chuff!* A shove on the butterfly, *chuck-a-chuck-chuck!* out go the sticks, a yank on the dumping rope, a thundering of earth on the steel bottom of the Lidgerwood; *clang* goes the dipper door back into place, snap goes the latch and wildly we swing back for another trip. Five yards at a trip and seconds measured the interval between. Hundreds of shovels were beating the world's record for moving earth. And Jim Hall was the champion runner of the C. Z.

Steady-eyed, white-faced, grim-jawed, silent, I've seen him stand there for a full eight-hours' shift, without one minute's rest, taking every ounce of power out of the old Bucyrus, figuring the swing of the boom, studying the moves forward between trains of empty cars, calculating to the exact fraction of an inch just where we would drop the dipper, watching me and working with me until he and I, shovel, dipper, boom and engines, were just one huge machine, a thing of intelligence and power. There is skill in labor, and art—yes, much art.

I stood it a year and I quit. I wanted to live. Two cranesmen ahead of me had drunk themselves to death on Balboa rum to keep themselves keyed to the highest pitch. The man ahead of them placed a .44 in his mouth and blew the top of his head off one night in the quarters at Empire. He hadn't been able to sleep for a week. Jim Hall had killed them. He had worked them to death. I know that he worked them to death for he came within an inch of working me to death. And I have a paper signed and sealed saying that I was one of the best cranemen in the Zone. I got this because Jim Hall worked me so hard I made a record. No credit is due me. No egotism is mixed up in this.

All four of us were bigger, stronger men than Jim Hall. I weighed two hundred and fourteen pounds. He weighed about a hundred and forty-five. The difference was that he was obsessed. I read his mind, read his soul as we worked there together day after day. It was our two brains that ran the big machine. Working together, sweating, scheming, amidst the terrific roaring of his engines and mine, the clatter, the clanging, the throbbing that shook us like rats in the teeth of a dog, our brains welded together and I knew his thoughts as he did mine.

When he cursed Gold Hill that crept down, down, down into the cut and pointed his shovel into the toe of the slide and it gained and pushed us back day by day, week by week, month by month, I raved at it with hysterical oaths.

Yet although I hated Gold Hill and fought it with bitter heart, one Monday morning I quit and swung down from the boom with giddy head. I staggered and fell and two of our blacks got hold of me and steadied me across the tracks and on to the path leading up the hill to Culebra village. And I heard Jim Hall cursing Gold Hill as I went away. He was talking to it as to a thing alive.

"You got him. You beat him. You licked him. But you can't get me. ——you, you can't get me."

I had one greasy glove on. I remember looking at it curiously. And I remember those exact words. And I remember the half-insane, half-hysterical, half-womanly laugh that followed his remarks.

They say that Jim Hall cried next week when his name stood third on the list in the ZONE RECORD, while he was breaking in another man in my place. The next week he was second. It was three weeks before he was back to his place at the head of the list.

And two years later I drifted back. I had come lengthwise up the Andes and the West Coast by

boat and trail, working and tramping. I was strong as an ox. I caught a train of empty Lidgerwoods coming off the dump at Balboa and rode them back into the Cut. I peered off as we began to pass the shovels.

There were many new faces at the throttles at both shovel and boom-engines. Two years before I had known 'most all of them, at least by sight. Now I didn't recognize very many of them. Two years had thinned their ranks. Some had gone back to the States and the flesh of others mingled with the red clay of Monkey Hill on the outskirts of Colon. Some raved in the madhouse at Ancon.

The whistles blew for quitting-time as we drifted on to a spotting-track on the toe of Gold Hill. Men began to swarm toward the waiting labor trains. It was when I had swung down and was looking at the battered fleet of shovels that I saw the familiar old Bucyrus; the 84. Jim Hall stumbled down and started half-groping his way toward a labor train. Yes, he was there yet. He hadn't missed a day since I had been gone. I seized him by the arm and helped him against his protests across the tracks and into a car. On a rough board-seat I sank down beside him.

I was brutally frank. I told him he was all in, that he had missed too many boats. I told him he had done his part, more than his part. I told him he would be a dead man within a month. It was only when he turned and looked into my eyes that I saw the mental flint, the mental cold steel, the indomitable will that held this man to his task after his body had broken down. He smiled wanly and shook his head.

"We just got to keep gnawing away as the slides come down. Finally the walls will brace and stay back when they get adjusted. I wish you'd come back and crane for me. I've learned a few tricks I didn't know. I can clip a few seconds that I couldn't clip before.

His voice dropped to a hoarse confidential whisper.

"I'm setting a cruel pace for the shovels. I've raised my own record twenty-five per cent."

That was in 1909. I did not go to work as steam-shovel craneman. I am no hog. I had had enough. I worked as engineer of a locomotive crane. I ran a stiff-leg. I drove a gang of Gallego Spaniards. I ran a relay-pump and an electric hoist. I was telegraph operator and towerman at most of the stations on the P. R. R. But I always found time to drift over into the Cut and stand and gaze at the snorting steam-shovels tearing into the toes of the huge slides; whole mountainsides crawling like glaciers down the sides of the Cut.

And I always looked for and I always saw Jim Hall. But very seldom he glanced off and saw me. And week after week, month after month, I scanned the CANAL ZONE RECORD to see if his name headed the list. And each week the total yardage he had handled was a trifle greater than the week before.

It was early in 1913 that we on the P. R. R. began to get real busy. The waters of Lake Gatun were rising rapidly. They were creeping foot by foot up the face of the doors of Gatun upper locks. Towns were being moved. The city of Gorgona, a place that sheltered some eight thousand souls,

The last dipper full of earth taken from Culebra Cut. This happened at 10:54 a. m., September 10, 1913. Albert H. Geddes was at the levers and W. I. Hudson was on the boom of shovel No. 210. Shovel No. 226 was also in at the finish with H. S. Hayes and A. E. Alexander. As the last train pulled out of the Cut it was met all along the line with the greatest ovation that has ever been made on the Isthmus. Steam shovel and engine whistles, hand clapping and every possible method of applause greeted the train as she steamed on to make the excavation of Culebra Cut a matter of history.

was cut into sections and loaded bodily on cars and moved. The huge Gorgona shops, with machinery that required special cars in many instances to stand the weight, were loaded and taken away. Matachin, Frijoles, Lion Hill, Tiger Hill, all the old and all the new camps in the lake basin had to come out and we on the P. R. R. had to work swift and fast to get them out in time. The rising tide was soon to cover a hundred and seventy square miles. Our old line was already torn up and removed and we were skirting the lake on the new location.

Like clockwork we worked but like clockwork with pendulum removed, running wild, working at top speed to beat the rising water. At last the water poured over the spillway at Gatun dam. The lake was full. It stood within a foot of the top of the big coffer dam at Gamboa. Only Culebra

Cut delayed turning the water through. Men fumed and cursed and lost heart. Weeks passed, months; it was in the Fall that we began to get rumors that the shovels in the Cut were working on the bottom of the proposed canal. Then quickly came the report that the Cut was ready for the water to be turned through. The tracks were being torn up and the machinery moved out. A few shovels were left until the very last, nibbling off the very tip-ends of the slides.

It was Sunday morning late in the Fall. Every man who was not actually working at the time gathered along the Cut to see the water go through. Right well I remember the bottom of the Cut that morning, three hundred feet wide and flat with a deep drainage-ditch in the exact center. And right well I remember the gaping Cut itself. A yawning gash nine miles long and over six hundred feet deep at Gold Hill, a great scar into the very vitals of Nature.

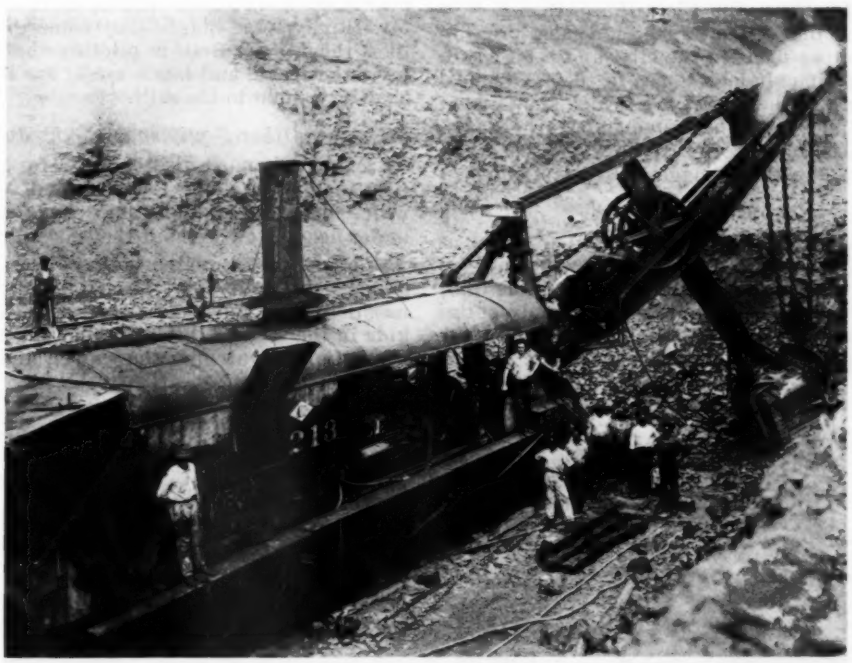
Boom! Boom! Boom-boom! Boom-boom-boom! came the muffled reports of the dynamite bombs that had been placed along the face of Gamboa dike. The water shot upward in a foaming cataract, visible for miles. Then came the coffee-colored flood raging through the Cut.

Cheer on cheer. Men were screaming mad with joy. Their shouts welded together in a mighty roar that echoed above the roar of water tearing through the Cut. Their cries ran the full length of Culebra and back again many times. This was the supreme climax of the work that cost the U. S. A. four hundred million. This was the realization of dreams since Balboa first stood on Darien's peak and glimpsed both Atlantic and Pacific. This was the surrender of Culebra, breaker of hearts, killer of men.

The great sirens on the power-houses were booming as hysterical men yank, yank, yanked on the ropes until arms grew numb and they tied them down to blow until the steam ebbed from the mighty boilers. Ships of all nations lying in the harbors of Colon and Panama were giving tongue to their joy in huge blasts, tugs in the channels, five hundred locomotives along the P. R. R., every industrial plant in Colon and Panama, pleasure-launches, everything that boasted a whistle was lending volume to the roar that rose in a crescendo to the very heavens and echoed back again and again and again. It was only when we had grown weak from exhaustion that we desisted.

And turning, we clambered along the sides of

(Continued on page 279)



This 95-Ton Bucyrus shovel, I. C. C. No. 213, held all records for steam shovel excavation on the Panama Canal. According to the Canal Record dated March 31, 1910 this shovel, working in Culebra Cut, dug 4823 cubic yards of earth and rock, place measurement in 5 hours 20 minutes time actual digging. This amounts to 603 cubic yards per hour for every hour under steam and 905 cubic yards per hour for every hour actual digging. This record was made on March 22, 1910. This same shovel, during the same month, broke all monthly records by excavating 70,290 cubic yards of soft rock in 26 days.

Rock Excavation with a Small Revolving Shovel

Handy Bros. of New York City Rushing Work on Basement Excavation for an Apartment House, Using Up-to-date Equipment

A CONTRACTOR who undertakes excavation work in or near New York City is up against a pretty stiff proposition. His work is frequently solid rock, he is cramped for space and as with everything in New York City he must work fast—time is the most precious thing in New York City. As a consequence the city contractor must have an extremely efficient organization and above all his equipment must be of the best.

Handy Brothers, 106 Field Place, Bronx, New York City, is one of the largest and most progressive contracting firms in the city, and a big share of the most difficult jobs comes to them. Typical of their work is the excavation which they are at present doing for the basement of a large apartment which is to be erected at Fordham Road and Jerome Ave., by the Manager's Realty Company.

Steam Shovel Work

The bulk of the work, 90 per cent of which is in solid granite rock, is being done by an 18-B Bucyrus revolving shovel, and while the time limit of the contract is five months, Mr. Handy states that with the aid of the little "whirly" the work will be completed three months from the date of commencement. As about 40,000 yards of rock and dirt are to be removed, this speaks very well for the efficiency of the management and of the machine.

Two stiff leg derricks are used to aid in removing some of the larger rocks, many of which alone are big enough to fill a truck. We noticed, however, that the little Bucyrus was handling most of these big fellows by the old chain and bucket method. "You can't upset that baby," said Mr. Handy, "the bigger they come the better she likes them." K. Belli is piloting the 18-B on her present voyage, and much credit for her excellent showing is due to his skill.

Other Equipment on the Job

Due credit must also be given for the fine performance of the big Packard and Mack trucks which daily make their mile and one-half haul under heavy load without the least sign of trouble.

Sixteen steam drills, built by the Wickes Machinery Co., and three Ingersoll-Rand jack hammer drills are kept busy ahead of the shovel. The kids in the section think the blasting is almost as much fun as watching the shovel, and one of the

(Continued on page 279)

Handy Bros. 18-B Bucyrus revolving shovel excavating for an apartment house at Fordham Road and Jerome Ave., New York City. The shovel is loading a Packard truck. New Yorkers are as interested as anyone else in steam shovel work, as can be seen by the number of "railbirds" watching the whirly work.

The Excavating Engineer

A Monthly Publication Devoted to Excavating and Allied Subjects

Subscriptions, payable in advance, $1.00 a year for 12 numbers, 50 cents for six months.

To foreign countries, including postage, $1.00 a year, 6 shillings or 10 francs.

Advertising copy should reach this Office by the 10th of the month before date of issue.

THE
EXCAVATING ENGINEER PUBLISHING CO.
Bradlee Van Brunt, Manager and Editor
South Milwaukee, Wisconsin

A Few Will Remember

It is nearly eight years since the water was let into the Panama Canal. However, Mr. Edgar Young's story "A Few Will Remember," in this number, is published for the benefit of those veterans who "will remember" and for the further edification of many others who shared the national pride in the final accomplishment of that magnificent job.

Mr. Young was one of those whose splendid spirit helped to "put it across." As to the facts behind the story, we can do no better than to quote verbatim from his letter to the editor.

"I was working on the construction of the Southern Pacific de Mexico down near the Tepic River when the revolution started and we had to quit. Mr. Taft sent a proclamation to all Americans in Mexico to get out and sent warships to several ports to take us out. I decided that I would make the overland trip to Panama and I got a mule and started for Guadalajara. I made the trip from Guadalajara to Mexico City and thence to Tapachula by train and walked to Guatemala City. By one method and another, but mostly on foot I finally made it to the Canal Zone.

"I went to work as locomotive craneman at Gatun and later was put to craning a shovel. I followed this at most of the camps along the canal. I know what it feels like to 'put the sticks out of her' and tie up the job. The old records of shovel performance that were printed weekly in the Canal Record speak eloquently of the high work of the shovel men. It was upon them that the entire canal hinged. 'Jim Hall' is a type, but the actual man was there. His finish was worse than I made it. When the water went through he went 'bugs' and was found sitting on the ground playing with pebbles among a crowd of small negro urchins. The fellow who drank himself to death on rum was named Kelly. He was one of the strongest men and one of the best cranemen I ever saw. He went all to pieces and finished up on Bay Rum. He would creep around the rooms at night feeling around over the dressers for the bottles of rum. The man who blew his brains out was named Cole. He borrowed sixty cents out of a friend's commissary book to get his laundry out of the commissary and after taking a bath he rammed an old forty-four into his mouth and let her go. The actual effects of the tropical sun upon a white man is a peculiar puzzle to scientific men. Many a little tragedy occurred down there.

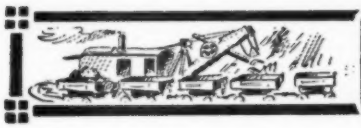
"It was my object to try to show the spirit of the fight made by Americans against grim nature and a deep-seated patriotic feeling that made men work until they dropped. There weren't any flags flying and there were many men heroic enough to die in the service of their country on decks of steam shovels, at boom throttles, and at every manner of work. I have never met a man who did not take pride in the Panama Canal, the greatest construction job in existence. And if men did their bit I am proud to say that the Bucyrus steam shovels did theirs. They are there all four ways from the Jack. I gave this particular Bucyrus a trifle more dipper capacity than she had because the very large dippers were only tried out on the extreme end of the job. The word 'Bucyrus' was an accepted synonym for 'steam-shovel' during the construction days. If they had failed there would not now be a Panama Canal."

The Steam Shovel

By Lydia M. D. O'Neil.
In Popular Mechanics

After the bidding is over and done,
After the fight for the contract is won,
And the chief engineer to the starting point comes
With all the details at the ends of his thumbs,
And the big Irish bosses arrive on the scene,
Lips lovingly locked on the faithful dudeen,
And the navvies assemble, their wages to win,
It is time for the steam shovel's work to begin!
From Culebra Cut to the far Simplon
I have groped in the depths of earth;
From the Jersey flats to the steep Cajon,
I have proven my lasting worth!
Railroad, tunnel, canal, or mine—
When all is completed at length,
It stands as a proof of the genius of man,
And proof of the steam shovel's strength!

The dust of the desert or swamp soil moist.
Alike shall I gather, alike shall I hoist;
I shall move a mountain or change the course
Of the river that taunts you with furious force.
I shall deepen the harbors and widen the fills,
And gouge you a path through the heart of the hills,
Extend you the margins of whimpering seas,
And laugh in the matching of power with these!
From Port Sudan to the far Cascades,
I shall go where the blueprints lead;
From Ningpo-fu to the Everglades,
As the contract's terms may read.
Railroad, harbor, canal or mine—
When all is completed at length,
Let it stand as a proof of the cunning of man,
And a proof of the steam shovel's strength!

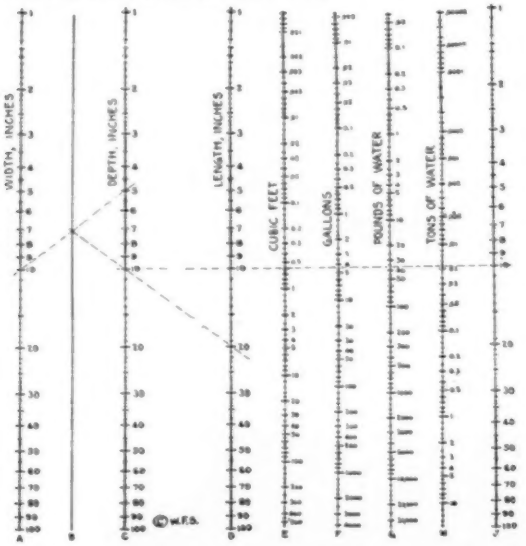


· FIELD NOTES ·

Gallons, Pounds and Tons of Water in Rectangular Tanks

By W. F. Schaphorst

Here is a chart that will be found useful for quickly computing the capacity of rectangular tanks or for computing directly the number of gallons of water or the number of pounds of water in such tanks. Or, it immediately converts gallons into cubic feet, pounds or tons of water, or vice versa. All the user of the chart has to do is to lay a straight edge across the chart three times as indicated by the dotted lines drawn on this chart and the problem is solved.



For example, how many pounds of water will a rectangular tank hold whose dimensions are: width 10 inches; depth, 5 inches; length, 20 inches.

Connect the 10 (Column A) with the 5 (Column C) and locate the intersection with Column B. Then from that located point of intersection run over to the 20 (Column D) and locate the intersection with Column C. Connect that point of intersection with the same point on Column J. Column C and J, it will be noted, are exactly the same. They are made the same in order that the last line (from Column C to J) will be perfectly horizontal.

To find the number of pounds of water, now, consult Column G. The answer is—a trifle over 36 pounds. Roughly we would call it 36 pounds.

The same horizontal line, you see, simultaneously gives the number of cubic feet (Column E) the number of gallons (Column F) and the tons of water (Column H) in this selfsame rectangular tank.

In case it is desired to convert gallons into cubic feet, or pounds of water into gallons, etc., it is plain that a simple horizontal line will do the trick.

All of the columns are plainly marked so that there can be no misunderstanding, and after reading this over once it will not be necessary to read it again for there is practically nothing to remember. The chart itself is self-explanatory.

The range of the chart is wide and easily covers most ordinary conditions. It is based on 231 cubic inches per gallon, 62.5 pounds of water per cubic foot; and 2000 pounds of water per ton.

To make the chart still more convenient it might be well to point out the fact that digits can be added to the figures in Columns A, C, and D. Thus if the tank is 100 x 5 x 20 inches the same dotted lines would solve the problem and the answer in Column G would be 360 pounds instead of 36 pounds.

Again if the dimensions are 100 x 50 x 200 inches, the answer would be about 36,000 pounds, the number of tons would be about 18, the number of gallons would be about 4,300 and the number of cubic feet would be about 600.

In other words add as many digits or move the decimal point as many places to the right in Columns E, F, G, and H, as are added to the figures in Columns A, B, and D.

The Care of Concrete Mixers

By L. P. Lessard

Sales Dept., The T. L. Smith Co., Milwaukee

If contractors would give their mixers the little attention that they require, they would last much longer. In most cases the operators are fully responsible for the upkeep of the machines and are never called to task because the mixer is in run-down condition. If the contractors themselves or a responsible foreman would see to it that their mixers were properly greased, oiled, cleaned, etc., there is no doubt that the mixer's life and efficiency would be materially increased.

Many building contractors do look after their mixers and their machines reflect this care in their operation. However, workmen usually leave their mixer just as they finish with it. Only recently the writer saw two workmen one morning pounding the loading skip with sledge hammers, trying to clean it out, because they had neglected to wash it out the previous evening. Imagine the mixer going through this pounding process every morning and possibly more frequently. No wonder the mixer lasts only a short time and needs to be replaced.

The following suggestions for taking care of building mixers are intended as an aid to those

contractors who do not but should give their mixers careful attention. If followed carefully, good results will be noticeable in the looks and operation of the mixer.

Setting Up

When you buy a new mixer, see that it is assembled correctly before starting. Turn down the grease cups, oil the wearing surfaces where necessary, see that the bolts and nuts are tight and be sure everything is all right, then go ahead. Manufacturers always send instructions for setting up, which should be your guide when assembling.

Oiling

Oil your machine liberally. Give the drum rollers plenty of grease; they have the heaviest duty. Don't forget your engine, either; it needs oil. Follow the engine oiling instructions carefully. Oil the drive chains to make them drive smoothly and endure. Oil all gears, especially bevel gears. Use a good quality of machine oil that will not thicken when cold. Also use a good grade cup grease where grease is required.

Feeding

It has been found that as far as mixing is concerned it does not matter in what order materials are fed into the drum. The feeding is done to meet the convenience of the operator. If desired the old method of hand mixing can be adopted as follows: Sand and cement, then add water and follow with crushed rock or gravel. A good way to get cement in without "dusting" is to put it into a barrow of sand, or still better, to add some water to the batch before putting in the cement.

Where a sharp stone is used in the batch, it is well to put in a portion or all the sand first, as the sand will act as a cushion and protect the shell of the drum.

Do not fill the drum too full. A big batch mixes more slowly than a small one. There is a happy medium between best time per batch and best quality, which experiment will determine. Cement Mortar or "Sloppy" concrete is best mixed in batches of reduced size.

(To be continued)

DEVICES YOU OUGHT TO KNOW ABOUT

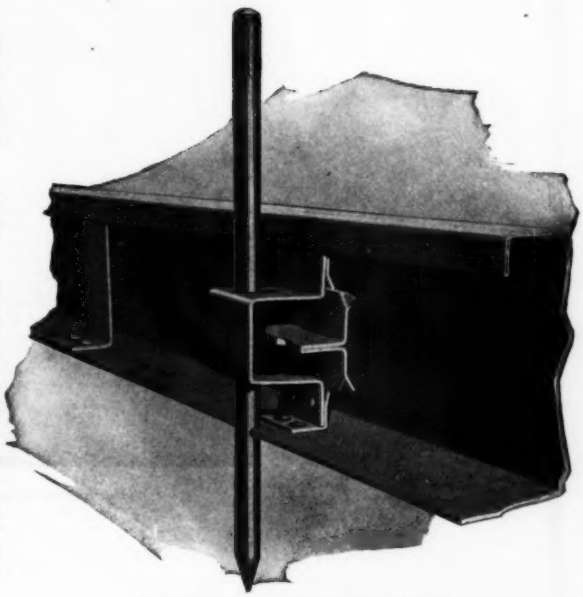
New Lakewood-Hotchkiss Road Form

After three years development work a new steel form for concrete road construction has been developed by the Lakewood Engineering Company, Cleveland. The new Lakewood-Hotchkiss form is designed to meet all the requirements of modern road construction.

Lakewood-Hotchkiss blue annealed, high carbon steel road forms are furnished in sections 10-ft. long, and in the heights for road thicknesses of 5, 6, 7, 8 or 9 inches.

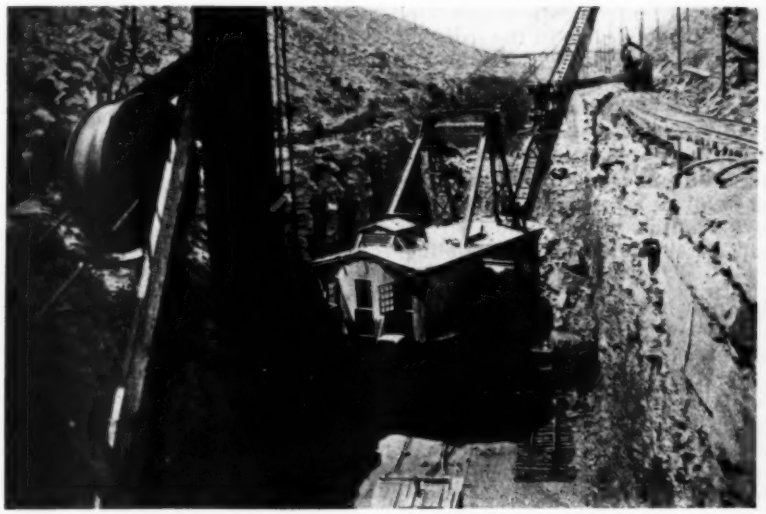
The distinguishing feature of the design is that a somewhat lighter metal has been used for the main section of the form, but this section has been reinforced by stiffening members, advantageously placed. Each 10-ft. section has the top flange supported at five intermediate points by a heavy stiffening iron. This principle is the same as is used in bridge design, where light members are riveted together to form a strong truss, rather than using one solid heavy section of sufficient strength to carry the load. Lakewood-Hotchkiss Road Forms also are different in that electric spot welding is used in addition to riveting to fasten the various members of the form together.

The Lakewood-Hotchkiss Road Form has a bottom flange 4 inches wide, giving a large bearing area on the ground. The top flange is 2¼ inches wide, which is ample as a rail for the finishing or subgrade machines. The turndown section of the



The New Lakewood Hotchkiss Road Form

top is 1¾ inches deep, making for unusual strength at this point. The forms are staked to the ground with three stakes to each 10-ft. section. The stake pockets have elliptical holes giving considerable



Looking south through the rock cut. Bucyrus 225-B shovel is digging at grade, 50 feet below the loading track.

Bucyrus 225-B at work on the curve at Station 170. Close quarters for the loading track.

Bucyrus 225-B Electric Revolving Shovels Digging [illegible]
Hydro-Electric [illegible]

Dumping a dipper load of 8 tons of rock into the Westerns. A train of empties is passing on the track above.

Just after dumping a load. Rip-rap above the loading track is dumped from tracks on the upper level to hold the banks against slides.

ng R enstown-Chippewa Power Canal, near Niagara Falls
ctric sion of Ontario

leeway when driving the stake, so that it does not disturb the alignment of the forms. After the stake has been driven until its head is about an inch and a half below the top of the form, so that the stakes will not interfere with the finishing machine wheels, the form is clamped to the stake by a heavy wedge member sliding in the stake pocket. This wedge is heavy enough to allow driving with a sledge hammer. It has a quarter-inch bearing on the stake, and cannot become bent or rapidly worn. These wedges may, however, be easily replaced when worn. They are held in the pockets and cannot become lost on the job.

Lakewood-Hotchkiss Forms are built so that any section may be removed from a line of forms set up to allow passage of trucks or other contractors' tools. There is an extra heavy slide, at the joint, which holds the forms in alignment, both laterally and vertically, and assures a smooth joint between the forms over which the finishing machines may run. These slides are extra heavy, and so located as to be accessible for driving with hand hammer when setting up or taking down the forms. It is to be noted that the top of this slide accurately fits into the channel shaped head of the road form. It can be definitely stated there will be no opening of the forms at the joints because of the careful working out of the details of this locking device.

There are no rivets in the top flange of the form to get worn and loose under the wheels of the finisher or subgrader.

The sections of form are made from steel especially milled to size for each height of form. The rolled edges of the top and bottom flanges are so smooth that a man cannot cut his fingers while handling the form. It is the form with the velvet edge.

A New Compressed Air Operated Machine for Removing Pavement and General Demolition Work

American progress seems to be measured by the substitution of efficient mechanical methods for costly hand methods in every field of endeavor. You have no doubt seen several gangs of three or four men each cutting pavement with the old hand methods. One man would hold the chisel and the other two or three would strike with eight-pound hammers. This was hard work. The progress made by these gangs, if they worked continuously, was slow but they did not work continuously. To estimate that 25% of the time was lost in resting, talking and lighting pipes would be conservative. A new method for removing pavement of all kinds and for demolishing all types of masonry and concrete has been perfected by the Ingersoll-Rand Company, 11 Broadway, New York.

The principal feature of this new method is that the work is done rapidly by efficient compressed air operated machines instead of by slow, laborious and costly hand work.

The field of the method is almost unlimited: electric power companies, street railway com-

Cutting a Trench for Pipes or Cables

panies, wrecking companies and industrial plants use the method for various kinds of work. It is also used in smelters and refineries for removing the slag in reverberatory furnaces.

Until lately all of this work was done by hand and even now much of it is being done by hand. However, a number of companies have standardized

The Ingersoll-Rand Paving Breaker

on the new Ingersoll-Rand methods and machines. By doing this they have reduced the cost and time of this work amazingly. One case on record shows a cost saving of about 67 per cent and a time saving of about 75 per cent.

The paving breakers themselves are very similar in construction to the most modern non-rotating type of hand hammer rock drill. They are extremely simple and rugged and are all steel machines, principally drop forgings, so that they will stand the most severe usage encountered in their work. They are "one-man" machines.

Two paving breakers are operated by compressed air furnished from one small portable gasoline or electric driven compressor.

Following is a comparison of the machine versus the hand method and the tearing up of an asphalt pavement for the concrete sub-base for the laying of electric cable duct:

A very good crew of eight men using hand methods will cut about 80 linear feet of 18" to 24" width asphalt and concrete in an eight-hour day. The asphalt averages 3" to 6" in thickness and the concrete about 6". That means 10' per man per day, or 50 cents per linear foot at a $5.00 wage. Three men with a compressor and two "Paving Breakers" cut an average of 300 linear feet per day. This costs about 16 cents per linear foot when wages, operating cost, interest, depreciation etc. are all taken into consideration. That means a saving of two-thirds in cost—and the work is done in about one quarter of the time.

The above figures are not estimated. They were furnished by a large Eastern public service company which uses four of the above-mentioned outfits. They say that each outfit pays for itself every month—and their statement is backed up by figures.

The "Paving-Breakers" Have Cut Through the Asphalt Surface, Broken Up the Concrete Sub-base, and Loosed the Soil

For detailed information write the Ingersoll-Rand Co., 11 Broadway, New York, using for convenience one of the blank postals inclosed in this magazine.

SHOTS FROM THE FIRING LINE

Alabama

The State Highway Dept., Jefferson City, Mo., let contract to Stanley & Singer Construction Co., La Fayette, at $112,000 for grading, draining and gravel surfacing 12 mi. road; W. S. Keller, State Highway, Engr.

Canada

Vancouver and Vicinity

General contract has been let to Atkinson & Dill for $45,720 for the erection of a new wing to St. Paul's Hospital, Vancouver.

Contract has been let by Dominion Department of Public Works to Knott & Jones, Victoria, for rebuilding administration buildings at Work Point Barracks, Vancouver. Estimated cost, $20,000.

Work has started on the Edgewood-Vernon Road. When this 19-mile link is ready for traffic it will be possible to drive from Ashcroft, or points further north in the Caribou region, to Edgewood; and if the provincial government establishes a ferry between Edgewood and Syringa, as requested by the people of that district, the journey can be continued via Nelson to the prairie or to the south.

Jones & Rant, contractors, have been awarded the contract for grading and clearing two and a half miles of roadway in the new Constance Cove subdivision of the Hudson's Bay Company.

Contract was let to W. P. Tierney, contractor, Vancouver, by the Provincial Government, to build fifteen miles of the provincial highway. Mr. Tierney stated that his company can give employment to three hundred men on the contract for eight months. His office will be situated at Cascade. Estimated cost of work, $250,000.

Tenders are being called by the provincial government for the hard surfacing of the highway between Nanaimo and Chase River school, a distance of three miles.

The provincial government is being urged to assist in paving this year at least a mile of the Scott road through the lowland at South Westminster.

Central States Notes

Mr. E. J. Scott of St. Louis was a recent visitor in Chicago. Besides being one of the pioneers in the coal stripping game, he is strong rooter for the Cardinals to win the National League pennant. Mr. Scott says, "If we only had some pitchers."

Mr. C. D. Smith of Memphis dropped into Chicago for a few days last month. He claims Chicago is twice as hot as Memphis.

Mr. W. J. Lester has been a caller in Chicago several times this past month. Mr. Lester is exceedingly active in the coal stripping game.

The Sheehan Construction Co. of Indianapolis has recently been awarded about five miles of sewer work in that city. They expect to install draglines upon this work.

Nash Bros. have moved their Class-14 Bucyrus caterpillar dragline from Chicago, and it is now at work in Detroit.

Mr. M. E. Mogg of Indianapolis was a caller in Chicago a short time ago. He has a new summer home at Lake Geneva where he spends these hot days. Mr. Mogg is a coal operator in southern Indiana.

A contract was recently awarded to List & Gifford of Kansas City, for bridge filling and bank widening

comprising about 500,000 yds., by the Missouri Pacific. The work is between Reed and Crane, Mo.

The Great Lakes Dredge & Dock Co. of Chicago, have been awarded the contract for rock excavation in the Calumet river.

Illinois completed 341 miles of hard surfaced roads during 1920, a greater mileage of similar type of construction than was built in any previous year by any state. Pennsylvania during 1920 constructed 410 miles of permanent improvement, but had during the year twice the mileage under contract that Illinois had.

R. L. Harper is looking for a position as engineer on standard or revolving shovel. He can be reached Western Hotel, South State St., Chicago.

The city of Cleveland, Ohio, with R. Hoffman, city engineer in charge, has completed plans for dredging three miles of the Cuyahoga river. The cost of this job is figured at about $1,000,000.

The city of Canton, Ohio, with W. E. Sarver, city engineer, in charge, has plans under way for dredging and straightening channel of the middle branch of East Creek. The project also involves the construction of a concrete retaining wall on the west side of the creek and it is estimated will involve the expenditure of $250,000.

The Great Lakes Dredge & Dock Co., 104 So. Michigan Ave., Chicago, have been awarded the contract for rock excavation in the Calumet river, which project is in charge of the U. S. Engineer office. The company's bid was $119,538.

State Highway officials of Illinois announced that more than one hundred and thirty miles of Illinois highways was offered to contractors for bids July 12th for road construction. The roads lie in eighteen different counties. Road construction will be pushed rapidly according to Gov. Small.

Joe McKee, Carthage, Ill., was awarded contract for construction of drains in Blue Grass Creek Drainage District at $9,985. Raymond Cons. Co. was awarded contract for material.

Minnesota

The Palatine Mining & Developing Co. is constructing a 21-mile line of the Port Arthur-Duluth & Western R. R. at the Minnesota boundary to tap a 2,200-acre iron ore deposit in Cook county.

Missouri

Five hundred miles of road construction are to be added to the McCullough-Morgan system according to the house roads committee.

New Mexico

In connection with bids opened last month covering Federal Aid road projects complete with structures, the following were low bidders and contracts awarded as follows:

Federal Aid Project No. 30, Lea County. Length of project 47.734 miles, located across Lea County east of Roswell, to Allhands & Davis, Cleburne, Texas, $46,707.02, state to furnish culverts amounting to approximately $1600.00.

Federal Aid Project No. 35, San Juan County. Length of project 14.507 miles, located between Farmington and Aztec, to Mishou, Clark & Teyssier, Pueblo, Colorado, $68,505.67, state to furnish culverts amounting to approximately $6,500.00.

Federal Aid Project No. 52, Socorro County. Length of project 11.277 miles, located in Datil Canyon, to J. V. Stryker Construction Company, Las Vegas, N. M., and Denver, Colorado, $58,362.37, State to furnish culverts amounting to approximately $3,500.00.

Federal Aid Project No. 53, Torrance County. Length of project 35.671 miles, located between Lucy and Encino, to J. V. Stryker Construction Company, Las Vegas, N. M., $41,624.73, State to furnish culverts amounting to approximately $4,200.00.

Federal Aid Project No. 58, Union County. Length of project 57.965 miles, located between Clayton and Gladstone, to Peterson Shirley and Gunther, Omaha, Nebraska, $69,844.49, State to furnish culverts amounting to approximately $5,000.00.

Federal Aid Project No. 59, Union County. Length of project 54.171 miles, located between Clayton and Nara Vise, to J. V. Stryker Construction Company, Las Vegas, $74,194.47, State to furnish culverts amounting to approximately $3,000.00.

All of the above amounts exclusive of 10% for Engineering and Contingencies.

New York District

New England Power Company, Worcester, Mass., is letting a contract to the Aberthaw Construction Company, Boston, Mass., for the construction of a large hydro-electric generator plant near Searsburg, Vt. Work will be commenced in the near future.

Contract for the construction of 56,838 sq. yds. of reinforced concrete pavement on the Perryville-West Portal road, Huntington County, N. J., has been let to the New Jersey Construction Company, of Hackensack.

The Arthur A. Johnson Corporation, Long Island City, N. Y., has secured contract amounting to $512,000.00 for the construction of a bituminous concrete Warrenite bitulithic pavement on a Portland cement basis in Morris Co., N. J.

The Newark Paving Company, Newark, N. J., has been awarded a large number of road contracts throughout the state.

The Tri-State Construction Company, Bridgeton, N. J., has been doing a great deal of road work lately and has been awarded a contract amounting to $415,000.00 by the State Highway Commission.

The New England States are rapidly completing their extensive road building program and numerous contracts have recently been awarded throughout that section. New Hampshire and Massachusetts are especially active in this work and many more contracts will be let during August.

Work on the plans for the New York & New Jersey vehicular tunnel are again under way and preliminary excavation on the Jersey shore will soon commence.

George A. Breymann & Bros. 17 Battery Place, New York City, are operating the Bucyrus dipper dredge Toledo in the East River channel off 35th Street, New York City.

The New Bedford Water Department has installed their new Bucyrus 14-B clamshell machine on their extensive piping line job. They are now operating two 14-B machines one as a shovel and one as a crane. The operator is Antone Gracia of New Bedford.

The Ulen Contracting Corporation of New York has recently signed a contract with the Bolivian Government for the construction of 128 miles of road in Bolivia. This is to extend from Villazon near the border of Argentine to Atocha, and will be the first length of the all rail route from La Paz to Buenos Aires. It is stated that this will mean a saving of two days in travel from New York to Buenos Aires. American Equipment will be installed on the contract. The Ulen Contracting Corporation has done a great deal of work in South America in the past six years and is at present constructing sanitation plants in Uruguay and Bolivia to the value of $7,500,000.

Northern States News

John Kohler, Frazee, Minn., was successful bidder on Judicial Ditch No. 2. Wabasha County, Minn. This work consists of 7½ miles of main ditch and 1½ miles of branches, comprising a total yardage of approximately 62,546.

John Kohler of Frazee, and Pratt & Cummings of Renville, Minn., were successful bidders on Drainage Ditches No. 20 and No. 21, respectively, in Becker County, Minn.

A. Guthrie & Co., Inc., St. Paul, Minn., received contract of Minnesota Trunk Highway No. 3, consisting of 7½ miles of grading, Lake City to Wakasha.

Hajney & Peterson of Braham, Minn., received contract for grading four miles of State Hwy. south of Braham.

S. J. Groves & Sons Company, Minneapolis, Minn., received contract for M. T. H. No. 10 consisting of fifteen miles of grading from Benson to Hancock.

Chris. Johnson, St. Paul, Minn., received contract for grading M. T. H. No. 10 twelve miles. Morris & Dougherty Company, St. Paul, Minn., received contract for grading two miles of M. T. H. No. 10.

Wilkins & Pettijohn, Park Rapids, Minn., have received contract for 16 miles of grading from St. Cloud to Royalton M. T. H. No. 27. Mike Barrett, St. Cloud, Minn., has contract for 11 miles of grading M. T. H. No. 27.

Nelson, Fulton & Nelson, Minneapolis, have contract for three miles of grading north of Sauk Center M. T. H. No. 28.

Winston Bros., Minneapolis, Minn., received contract for 14½ miles of grading M. T. H. No. 30 Fergus Falls to Erhard.

Manistique Dray & Transfer Co., Manistique, Mich., have received contract for building road No. 12 in Schoolcraft County, Mich., consisting of 5.044 miles.

Johnson, Drake & Piper have been awarded contract for 3.8 miles of 27 foot asphaltic concrete pavement on Superior Boulevard at $215,903.

Marshall County, Minn., has let the following contracts for grading and drainage:

Ten mile Job No. 2101, Argyle to Snake River involving 57,038 yards to E. Morberg, Oslo, Minn.

Thirteen mile Job No. 2102, Section 13, including 86,560 cu. yds. of excavation to S. G. Enabat, Warren, Minn.

Eight mile Job No. 2102, Viking to Steiner, 60,000 cu. yds. of excavation to P. O. J. Landin, Warren, Minn.

Five mile Job No. 2105, Holt east to Thief River, 45,943 cu. yds. to W. D. Tripp, Viking, Minn., and 4.7 mile Job No. 2006 comprising 25,000 cu. yds. of excavation, to Sollom & Moen, Middle River, Minn.

Peterson, Shirley & Gunther, Omaha, Nebr., were low bidders on F. A. P. No. 74 in Douglas County, South Dakota.

Gustafson-Lindell Construction Co., Unityville, South Dakota, were low bidders on F. A. P. No. 47 in Lincoln County, So. Dak.

Tobin and Maloney of Madison, So. Dak. were low bidders on F. A. P. No. 48, in Moody County, S. Dak.

M. D. Malloy, Bixby, S. Dak., was low bidder on F. A. P. No. 29 in Corson County, So. Dak.

Doud Bros., & Schreiber Engr. & Construction Co., Watertown, S. Dak., were low bidders on Webster-Milbank Road in Grant County.

North Carolina

M. E. Kennedy has finished his job at Gastonia, grading and leveling up building lots at Fairmount Park on East Franklin Avenue. This property is owned by D. H. Hanner. Just as it looked as if there would not be a job in sight when this was finished, Mr. R. P. Huffstetter and Mr. Gus. Ginn, the hustling contractors whom Kennedy is working for, took a spin over to Sharon in their Hudson Super-Six and landed a road contract for the South Carolina Highway Commission. This job includes grading and building seven miles of sand and clay roads connecting Hickory Grove and Sharon. This should keep the boiler hot for some time to come. Huffstetter and Ginn get the jobs and M. E. Kennedy, engineer and J. R. Martin, smoke agent, make the dirt fly with their Osgood 18 steam shovel.

Notes from the Pacific Coast

BY P. H. BIRCKHEAD AND C. W. WHITNEY

Construction of an 18-mile railroad, an extension of the Western Pacific, has been started. Palmer and McBryde of San Francisco are the contractors, and the line will run between Hawley and Beckwith.

Philadelphia Quartz Company's sand and clay operations will commence on August 1st, at Ione, California.

Plans to use the surplus waters of the middle fork of the Feather river for the purpose of developing a large amount of hydro-electric power as well as to impound water sufficient to irrigate large tracts of land in Butte and Yuba Counties, are being made by the Middle Fork Development Company. The plans call for the construction of four power plants along the banks of the river, for an irrigation scheme which will be started this summer to place a dam across Grizzly Valley to impound about 90,000 acre feet of water. The dam will be from 250 to 300 ft. in length and the Company's plans call for the development of about 185,000 H. P. in the four plants.

Mr. John Phillips of Sacramento, was low bidder at a letting recently held at Meridian, covering the excavation and cleaning out of about 52 miles of drainage ditches.

The Union Pacific has let the contract for grading and bridging a forty-two mile extension from Haig, Neb., to Wyoming, work on which is expected to be started without delay.

In order to facilitate construction work on the Pitt river (California) project, plans have been completed by the Pacific Gas and Electric Company for thirty-three miles of a standard gauge line, the main object being to reduce the cost of transporting material for the construction of the power houses on the Pitt River project.

Contract has been awarded to the Bent Bros., Central Bldg., Los Angeles, by the Sespe Light and Power Company on a cost plus basis amounting to approximately $1,250,000.00 for the construction of (1) The Bradfield Reservoir; (2) The Bradfield Auxiliary Power Plant; (3) The Brain Reservoir; (4) The Brain Canal; and (5) The Brain Main Power Plant, works to be built on the Sespe & Piru Rivers in Ventura County.

Twenty million dollars are to be spent on the Pacific Coast for highways and roads by the Federal government this year. A like amount will be spent by the states under the condition of the Federal expenditure, making the total amount of highway development this season $40,000,000.00. In addition the Federal government, through the Bureau of Public Roads of the Department of Agriculture, will expend $12,000,000 for construction of roads in national forests. In California twenty projects are now under way, according to C. H. Sweetzer, in charge of this district.

The new joint counties highway bill has been signed by the Governor. This bill is a final step toward the construction of the Sacramento Valley Boulevard, a highway through the part of the Sacramento Valley's river bottom district and one which will tap a territory formerly reached only in a roundabout way. This highway will extend from Red Bluff to Oakland, along the Sacramento River, through the great Sutter Basin and to the island district south of Sacramento.

Mr. B. J. Daniels is operating a Bucyrus Class-7 gasoline dragline on canal work for the U. S. Reclamation Service on the Klamath project between Merrill and Klamath Falls, Oregon.

Col. James G. Scrugham, State Engineer of Nevada, is actively pushing ahead the Boulder Canyon project by which it is proposed to develop a very large amount of power from the Colorado river, and also regulate to a very large extent the flow of that stream for irrigation purposes. A bill has been introduced into Congress and has passed the House by which the Government will authorize the States of Arizona, California, Colorado, Nevada, New Mexico, Utah and Wyoming to enter into an agreement among themselves providing for an equitable division and apportionment of the water supply of the Colorado river and its tributary streams. It is probable that private capital will finance the project.

The "world's greatest electrical project" is the phrase used by some engineers in describing the plans of the Southern California Edison Company for impounding the waters of the Colorado river and developing hydro-electric power on a huge scale for distribution over a wide area of the Southwest.

Edwin O. Edgerton, special counsel for the corporation and formerly president of the California State Railroad Commission, stated the project ultimately would involve possibly $800,000,000, or twice as much as was spent on the Panama canal.

Generations of a peak load of 4,500,000 horse power and an annual average load of 2,600,000 horse power from four development projects along the river will be possible, it is stated, if the stream flow is controlled by the first of the 400 to 500 foot dams planned for the head of Glen Canyon, Ariz.

Among the results of the project, when completed, would be:

Absolute flood control.

Provision for irrigation of 2,250,000 acres, of which 1,000,000 acres would be above the canyons.

Three hundred miles of the river would be made navigable.

The area which would be served with power includes the entire states of Arizona, Nevada and Utah, more than one-half of Colorado and New Mexico, one-fifth of Idaho and Wyoming and three-quarters of California with possibly large areas in northern Mexico.

Power could be used for the electrification of steam railroads, as well as for commercial, agricultural, mining and municipal uses, thus saving 90,000,000 barrels of fuel oil per year.

State Department of Engineering approved the formation of the Nevada Irrigation District. Estimated cost of first unit about $5,000,000.

The Ross Construction Co., 935 Forum Bldg., Sacramento, Cal., has been awarded the contract for dredging at fueling station at San Diego. The job is in charge of the Bureau of Yards & Docks, Washington, and costs $1,750.

Plans have been completed by the U. S. Engineer office at San Francisco, for the dredging of San Rafael Creek, in this district, the cost of which work is estimated will come to about $45,000.

Pennsylvania

The Pittsburgh & West Virginia Ry. has closed a contract for the construction of a 3¼-mile branch line to the coal fields owned by John A. Bell, of Pittsburgh, authority for which was granted June 12th by the Interstate Commerce Commission. The branch will be completed by December 16.

Southern States News

BY C. N. BALLENTINE AND E. J. WILKIE, BIRMINGHAM, ALA.

P. H. O'Brien, president of the O'Brien Construction Company, Birmingham, Ala., was a caller at Birmingham a few days ago. Mr. O'Brien is now using three of the Bucyrus 14-B caterpillar shovels on his large road contracts in North Carolina, and he reports very good progress on all sections of the work.

Geo. Williams, one of the well-known erecting engineers of the Bucyrus Company, is now at Manchester, Ala., supervising the installation of a large stripping shovel for the Manchester Coal Company.

Woolsey Finnell, Tuscaloosa, Ala., was the successful bidder on a large road contract recently let by the Kaul Lumber Company, Birmingham, Ala. Mr. Finnell has sublet nearly all of this work.

Stanley & Singer, LaFayette, Ala., have recently contracted for a considerable amount of highway work.

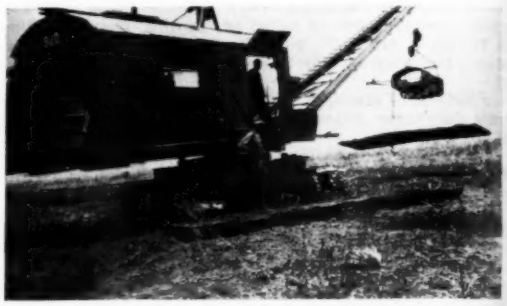
J. D. Morris, steam shovel engineer, Birmingham, Ala., is now working for the Manchester Mining Company, Manchester, Ala.

J. J. Quinn Company, Miami, Florida, will construct about eight miles of sewers in Miami. This work is under the direction of Chas. W. Morray, City Engineer.

H. E. Williams, El Paso, Texas, secured contract for building 24 miles of roads in Hudspeth County, Texas.

Rhodes & Eller, Nashville, Tenn., were the successful bidders for the road work recently let by the Tennessee State Highway Dept. This contract is for a section of road between Dyersburg and Newbern.

Contract for the construction of about 85 miles of earth roads will be let in the near future by the Supervising Board of District No. 3, Livingston Parish, Louisiana. J. M. Fourney, Hammond, La., is the engineer in charge.



These photographs show two Class-7 Bucyrus draglines working on the Napoleon B. Broward Drainage District, Fort Lauderdale, Fla. The machine above is moving from one ditch to the next on pontoons. The ground is muck from two to six feet deep, and running sand under the muck. The pontoons are five feet by eighteen feet, six inches thick. R. H. Marsh is running this dragline and Otto Stegman is oiler. The photo below shows another Class-7 Bucyrus Dragline digging a 12-foot ditch. George Hooker is running this machine with Charles Steers keeping her oiled. H. M. Ellerkamp is foreman on the job.

Foster & Creighton Company, Nashville, Tenn., were successful bidders for the contract for about 10 miles of roads in Cheatham County and Dickson County, Tenn.

Womack Construction Company, Sherman, Texas, were recently awarded contract by Johnson County for constructing about 15 miles of gravel road near Fort Worth.

Brooks-Calloway Company, of Atlanta, Ga., was recently awarded contract by the Interstate Railroad Company at Norton, Virginia, for the construction of 25 miles of a branch line into the coal fields in the vicinity of Norton. This work involves 500,000 cubic yards of excavation and the construction of three tunnels, the tunnels being 200 ft.

300 ft. and 600 ft. long. The contractors are now moving their equipment on the work. The excavation work involves about 75% solid rock, 15% loose rock and 10% earth.

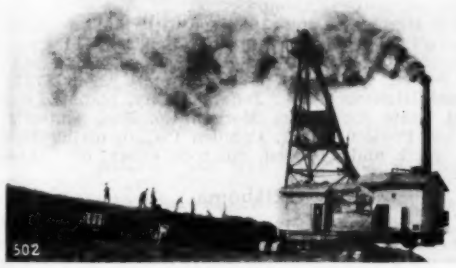
W. B. Crawley, Steam Shovel Engineer, is operating a shovel for the Brooks-Calloway Company on this work at Norton. Mr. Crawley recently returned to the States after having been employed in the mines of the Chili Exploration Company, South America.

Approval of the plans by the Power Commission for the construction of a power plant on the Coosa River was recently received by the Alabama Power Company, and the work of constructing this dam is now getting under way. Before work on the dam proper is started it will be necessary to construct 8 miles of railroad to the dam site from the L. & N. Railroad at Verbena, Alabama. Mr. L. V. Branch, is resident engineer on this work with headquarters at Verbena.

W. E. Hall, team contractor, Birmingham, has been awarded contract for the grading of a portion of the railroad being built by the Alabama Power Company. Mr. Hall has a large number of teams and wheel scrapers on the work.

Northern Drainage Dist. Commissioners, Bolivar County, Merigold, Miss., received bids July 26th, for the construction of 13 miles of drainage canals on Bradford Bayou. W. W. Boone of Cleveland, Miss., is the engineer.

Mr. C. H. Crowell is now at Lake Providence, overhauling a Bucyrus dragline for the Third Mississippi River Commission. He expects to stay at Lake Providence and operate this machine.



The Head Tower of Bucyrus Tower Excavator No. 903, Mississippi River Commission, at Work on the Third Mississippi River District, Gunnison, Mississippi

This machine excavated 700,000 cubic yards for the season and during the month of March excavated 73,000 cubic yards in 20 working days of 10-hour shifts.

On March 23 this machine in nine hours and 58 minutes moved 4,200.75 cu. yds. on a 500 foot haul. This machine is operated by J. G. Davis. J. T. Perry and W. F. Kellogg are running a Class-9½ Bucyrus dragline which has been working ahead of this tower excavator taking off the top of the levee and preparing the way for the big machine.

Texas

John Yasick is operating a 30-B Bucyrus and Jess P. Miller is busting smoke, for the Dallas, Texas Gravel Company. Their address is Irving, Texas. Miller and Yasick are members of the I. B. S. S. & D., District No. 1.

According to a statement prepared by the State Highway Department showing the status of highway construction in Texas on June 1, there are now 414 projects, involving approximately 4,000 miles, under the supervision of the department, these highways either being maintained, constructed or proposed. The total cost is estimated at more than $48,000,000. Concrete, bitulithic, gravel and macadam are the principal surfacing materials specified. There are also additional projects pending on which applications have not been completed.

A total of 130 projects involving 1,106 miles have been completed at a cost of $7,366,314. Approximately 2,300 miles, comprised in 192 State and Federal aid projects, are under construction at a cost of nearly $27,000,000, while plans have been approved for 82 projects providing for about 900 miles of highway, estimated to cost nearly $12,640,000. Ten additional projects to cost about $1,330,000 are pending.

The Southern Pine Lumber Co. is building a railroad up the Neches River Valley connecting with the line at Dibol in Angelina county. The road will be eventually built into Palestine and will probably be taken over by the Cotton Belt, it is reported. At present it is undecided whether it will tap the Texas State Railroad at Maydelle or Jarvis. A force of men is now working on the right of way in Cherokee and Anderson county and is within about fifteen miles of the Texas State Railroad. On account of the high hills on both sides of the Neches River, some reaching an elevation of nearly 800 feet above sea level, the road will cross and recross the river several times, it being more economical to bridge the river than to attempt the steep grades.

Wharton County let contract to Billingsley & Ryman, Bay City, and Howard Kneyon Dredging Co., Houston, for hard-surfaced roads and drainage; $650,000 available; Nagle-Witt Rollins Engineering Co., Wharton.

Ch. Engr., U. S. Bureau Public Roads, Washington, D. C., approved plans for Federal Aid Project No. 213, involving construction of 11.7 mi. 16-ft. gravel road on Highway No. 3 in Val Verde County; $50,229.33; R. T. Hunnicutt, County Judge; G. M. Jowers, County Engr.

The Woodward Manufacturing Co. is building a branch railroad 1¼ miles from its plant at Austin, to connect with the International & Great Western Ry.

Lamb County let contract to John Hamer for extending Highway No. 7 from Sudan to Bailey county line. Address County Commrs.

Collin County let contract to Hunn, Mayo Bros. and Rainey, McKinney, at $30,000 for 16 mi. dirt work and drainage structures in Plano Dist., Contract No. 17; F. W. Cawthon, County Engr., McKinney.

Houston Co. are having plans prepared for grading and surfacing with sand clay and native gravel, 16.5 mi. Kings Highway 21, 24 ft. wide, involving 150,000 cu. yd. borrow, 90,000 cu. yd. embankment, etc. About $119,570 R. E. Keller, Crocket, engr.

West Virginia

Pittsburgh & West Virginia Railway Co. reported to have let contract to build its proposed line from Cliftonville 3¼ mi. to coal mines owned by John A. Bell of Pittsburgh. Construction begins immediately. H. H. B. Holmes, Pittsburgh, Pa., is Ch. Engr.

Foreign

Africa

A scheme is now under consideration for the improvement of the agricultural possibilities of French West Africa by utilizing the Niger floods for the fertilization of the Segou-Sikoro district above Timbuctoo. A barrage across the river at the point where it leaves the mountainous regions and the digging of a canal on the right bank would provide means for the irrigation of an area which, it is estimated, should be as extensive as that irrigated in Egypt by the canals supplied from the Nile. An expenditure of 250 million francs would be required to carry out the scheme, which should make the region affected very fertile and especially suited for the cultivation of cotton.

PROSPECTIVE · CONSTRUCTION

Alabama

State Highway Dept. is preparing plans for grading, draining and graveling 4.8 mi. in Chambers Co.; estimate $90,000. Address W. S. Keller, State Highway Engr.

The State Highway Commission of Montgomery, will receive bids until August 2nd, for the construction of 10.3 miles of roads between Greenville and Fort Deposit.

Arkansas

According to County Judge Charles E. Moyer, a preliminary survey will begin soon for the County Road across Step Mountain, from the covered bridge on Little Maumelle River for the Perry County line.

California

The Western Pacific Railroad is considering an extension of the Sacramento Northern Railroad to Red Bluff according to J. P. Quigley, Supt. of Transportation of the Western Pacific Co.

Georgia

The Georgia & Florida Ry. will improve and reconstruct its line from Augusta to Padgett's Ga., a distance of 28 miles, and will also build 2 miles of new line, and construct a freight yard near Augusta.

Kansas

A new branch line of the Atchison, Topeka & Santa Fe Ry. from Satanta, to Springfield, Colo., will be built to the Western Kansas line. A connection from the Independence-Tulsa line to the Galveston main line will be built from Owen, Okla., to Fairfax, Okla., according to W. B. Storey, president of the road.

Kentucky

The chamber of commerce of Appalachia, Va., is taking steps to induce the Southern Railway to build an extension into Harlan county, to develop coal fields. Appalachia is on the Southern's line from Bristol to St. Charles, Va., and about 70 miles from Bristol.

Louisiana

The Orleans Kenner & Shell Beach R. R., which has been chartered with a capital stock of $1,000,000, it is reported, will build a line to Shell Beach in the St. Bernard district, near New Orleans. Harry K. Johnson, of New Orleans, may give information.

Illinois

Macoupin Co. are having plans prepared for paving, grading and draining ¾ mi. Marine Rd., 15 ft. wide, concrete, in Pen Oak Twp. About $40,000. W. E. Hawden, supt.

Comrs. Wabash and Lawrence Counties are having plans prepared for drainage system. About $75,000. Address G. C. Harvey, Sumner.

Michigan

State Highway Dept., Lansing, plans to grade, drain and surface 1¼ mi. State Trunk Line Rd. 13-8, Sect. A. Wexford Co., ¾ mi. to be surfaced with concrete and ½ mi. with gravel. F. F. Rodgers, state highway comr.

State Highway Dept., Lansing, plans to grade, drain and surface 5 mi. State Trunk Line Rd. 18-1, Sect. B, Cheboygan Co.; 1 mi. State Trunk Line Rd. 26-9, Houghton Co., bituminous macadam or bituminous concrete on macadam base; 8 mi. State Trunk Line Rd. 53-4 Sect. B, Lapeer Co. F. F. Rodgers, state highway comr.

State Highway Dept. Lansing plans to grade, drain and surface 1¾ mi. State Trunk Line Rd. 87-1, Oakland Co., 1¼ mi. State Trunk Line Rd. 14-34 Ingham Co., 5 mi. Federal Aid Project 54, Sect. B, Genesee Co., concrete or bituminous concrete; grade and drain 12 mi. Federal Aid Project 49, Sects. A and B, Cass Co. F. F. Rodgers, state highway comr.

State Highway Dept., Lansing, plans to grade, drain and surface 4½ mi. State Trunk Line Rd. 62-2, Sects. B and C, Cass Co. F. F. Rodgers, Lansing, state highway comr.

Minnesota

Bids will be asked soon for the paving of all of Babcock highway between Grand Rapids and Keewatin. Estimated cost of work about $850,000.

According to H. E. Pence, President of the Minneapolis, Northfield and Southern Railroad, it is planned to extend the Dan Pitch Road to Faribault at a cost of about $250,000.

Missouri

State Highway Dept., Jefferson City, plans to build 2.44 mi. state road from Bloomsdale, northwest, State Aid Project S 20.31, St. Genevieve Co., involving 9,696 cu. yd. earth and 6,644 sq. yd. rock excav., 1,658 cu. yd. borrow, 77.2 cu. yd. Class B and 55.1 cu. yd. Class C concrete masonry, etc. About $31,867.

State Highway Dept., Jefferson City, plans to build 4.21 mi. state road from Lexington east and west, State Aid Project S 20.52, Lafayette Co., involving 37,252 cu. yd. earth excav., 500 cu. yd. borrow, 22.8 cu. yd. Class B and 6.4 cu. yd. Class C concrete masonry, etc., cost $26,686; 3.3 mi. state road from Taylor north and south, State Aid Project S 20.39, Marion Co., 10,095 cu. yd. earth excav. 20,708 cu. yd. borrow, 33 cu. yd. Class B and 13.4 cu. yd. Class C concrete masonry, etc., $25,000.

State Highway Dept., Jefferson City, plans to build 8.5 mi. Cairo-Poplar Bluff State Rd., Federal Aid Project 179, Stoddard Co., involving 9,000 cu. yd. earth excav. and 84,483 sq. yd. gravel. About $88,200.

State Highway Dept., Jefferson City, plans to build 8 mi. Cairo-Poplar Bluff State Rd., Federal Aid Project 178, Stoddard Co., involving 8,250 cu. yd. earth excav. and 58,080 sq. yd. gravel pavement, etc. About $75,700.

State Highway Dept., Jefferson City, plans to build 2.97 mi. state road from Morgan Co. line, southward, State Aid Project S20.41, Camden Co., involving 17,160 cu. yd. earth and 2,000 cu. yd. rock excav. etc. About $27,352.

Oklahoma

St. Louis-San Francisco Railroad, it is reported, proposes to build a branch from a point 4 mi. from Bristow through the Kellyville oil field and to the red bank district, 12 mi. F. G. Jonah, St. Louis, Mo., is Ch. Engr.

Tennessee

John Curry Lumber Company, of Druid, N. C., will build 12 miles of railroad from Wilmot Springs to a point above Cosby, Tenn., including large bridge over Pigeon River and several small bridges.

The Nashville & Atlantic R. R. has applied for a charter to build a line several miles long from Champaign, Tenn., to a point on Rocky river. Incorporators include George N. Welch, Henry E. Colton, Wm. G. Pratt, Allan A. Dickerson and John Williams, Jr.

The Knoxville Railway and Light Company plan to lay new tracks on Central St. and to remove a part of its tracks from the south side of the street and place nearer to the middle. According to estimate of Commissioner C. G. Wayland the cost will be about $50,000.

Texas

The Kinney & Uvalde R. R. has been chartered to build an eight-mile line from near Cline Station, Tex., on the Galveston, Harrisburg & San Antonio Ry., to reach an asphalt deposit. R. J. Boyle, J. H. Grover and R. N. Gresham, all of San Antonio, Tex., are incorporators.

UMI

REVIEW OF BOOKS and CATALOGS

We shall be glad to review, in this column, such books and catalogs as are sent to us. Books reviewed in these columns will be supplied by The Excavating Engineer Publishing Company at the price named.

ROADWAY AND TRACK: By W. F. Rench, Civil Engineer. This is the most complete work yet published on this subject. The author is well qualified to write on roadway and track construction and maintenance as he has had over twenty-five years experience in the Maintenance of Way Division on the Pennsylvania Railroad. The following subjects are covered: essential elements of maintenance of roadway and track, right of way, drainage of roadbed and track, vegetation for banks, labor-saving devices and methods in roadway and track work, economics of roadway, tools, materials and their uses, track obstructions, renewals of rails, maintenance of main tracks, yards and terminals, a program of maintenance of way and track work, economics of track labor, maintenance problems and methods used, special duties in the maintenance of way department. 250 pages, 50 illustrations. Price $3.00. *Simmons-Boardman Publishing Co., Woolworth Bldg., New York City.*

CONCRETE PIPE SEWERS: A 22-page, 6 x 9, bulletin describing concrete sewer pipe; contains typical statements of leading Engineers on Concrete Sewers. It also describes with illustrations how concrete sewers are laid, how they are manufactured, tested and designed. *Portland Cement Association.*

QUARRY CAR PRACTICE: A 24-page, 7 x 9½, bulletin, describing old and new quarry cars. It is well illustrated showing the different types of cars in action in quarry work. *Easton Car and Construction Company, 50 Church Street, New York City, N. Y.*

"PAVING BREAKERS." A 12-page, 6 x 9, bulletin, describing with illustrations type BC-25 and CC-25 paving breakers. Giving illustrations of applications and lists of essential details. This bulletin also gives description, with illustrations, of portable electric air compressors, all manufactured by, *Ingersoll-Rand Company, 11 Broadway, New York City, New York.*

A LIBRARY OF RAILWAY BOOKS: A 32-page, 6x9, catalog which contains a list of books suggested by Editors of Railway Age, Railway Mechanical Engineer, Railway Electrical Engineer, Railway Signal Engineer, Railway Maintenance Engineer. This list is classified, gives a short description and price of each book. This catalog may be obtained by writing: *Simmons-Boardman Publishing Company, Woolworth Bldg., New York City, N. Y.*

EASTON SCOOP BODY FOR FORD TRUCKS; described in a 4-page 8½ x 11, bulletin. Contains price list of the different size bodies, table of dimensions and weights, also illustrations of the bodies in action on different applications. This body can be attached or detached in ten minutes and is the only body of its kind on the market. *Easton Car and Construction Company, 50 Church Street, New York City, New York.*

Reason Enough

Pat: "Sure, an' I'll never come to this t'eayter ag'in? Do they t'ink I'm a fool intoirely?"

Terry: "An' why not?"

Pat: "D'ye see that sign? 'In case of foire, walk out slowly t'rough th' foyer." —*The American Legion Weekly.*

Fair and Warmer

"Well, Bill," asked a neighbor. "Hear the boss has had a fever. How's his temperature today?"

The hired man scratched his head and decided not to commit himself.

"'Tain't fer me to say," he replied. "He died last night." —*The American Legion Weekly.*

A Few Will Remember

(Continued from page 265)

the Cut toward the various towns where we belonged. It was then that I suddenly came upon the old Bucyrus, the 84. She was muddy as a hog. Her smokestack had been knocked off and lost. Her dipper had been run out and taken down and was lashed to her deck with twists of cable. In place of the chain on her drums I noted a great reel of wire cable. She had been the last shovel to work in the Cut.

She had finished the job and had wound herself up out of the Cut at an angle of forty-five degrees on her own power with men placing short lengths of track ahead of her. She was within a rail's length of the main line of the P. R. R. and could be spurred in at any minute.

A few rods farther along I came upon Jim Hall sitting upon a boulder, resting. His chin was in his hands and he was staring down into the Cut with a look of serene satisfaction upon his emaciated face. I clapped him upon the back, shouting how grand it was that we had won. He did not move and I stopped, frozen by the fact which just then came to me like a shock. Jim Hall was stone-dead.

Rock Excavation with a Small Revolving Shovel

(Continued from page 266)

big problems is to hustle them out of danger before each shot.

Handy Brothers are at present operating two 18-B shovels and are planning the installation of a third Bucyrus machine in the near future.

The huge excavation for the Hell Gate power house of the United Light & Power Company, one of the most difficult jobs in this vicinity, was just completed by these shovels.

TRADE NOTES

The Allied Machinery Company of America, 51 Chambers St., New York City, have been appointed foreign representatives in all countries except the United States and Canada for the Universal Crane Company.

The Allied Machinery Company have offices in all the large countries of the world.

The Universal Crane Company's general offices are in the Swetland Building, Cleveland. Their product is a 3 to 4 ton portable gasoline or electric locomotive crane for mounting to suit working conditions.

The Universal Crane is now being used mounted on a motor truck in the electric street railway industry—coal and building supply work and contracting, handling dirt, coal, iron, sand, gravel, etc.

Very nearly any industrial condition can be met by the crane on one of its mountings—an industrial truck to serve large plants, foundries or scrap yards and others; a railroad flat car mounting for the railroad field; or rubber-tired trailers—continuous tread—ground foundations—portal piers, etc. for other work.

Holme: Did you know that Mike lost three fingers shooting craps?
James: No, how did he do it?
Holme: He didn't know they were loaded. —*Voodoo.*

'Twas midnight in the parlor,
'Twas darkness everywhere;
The silence was unbroken, for
There was nobody there.

Cheerio!

"Officer," asked a nervous old lady on her first trip over, "do you think the ship's going down?"

"Prob'ly not, ma'am, prob'ly not," responded the salty mate encouragingly, stroking his chin. "Y'see, the boilers ain't none too good. She's liable to go *up*."

—*The American Legion Weekly.*

FOR SALE

One 5-ton Holt caterpillar tractor. One 10-ton Holt caterpillar tractor. Used only short time. Guarantee first-class condition. One Nash Quad truck with "Hesse" two-wheel trailer and power winch, 7-ton capacity. Good condition. For further information and price address

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Coal Valley, Ala.,
May 3, 1921.

The Moon Manufacturing Co.,
128 N. Jefferson St.,
Chicago, Ill.

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We acknowledge receipt of your letter of April 28, 1921, regarding the Turbine Generator equipment which you furnished for our Bucyrus No. 150B Steam Shovel.

The outfit we have in use has given us service, which to date has been entirely satisfactory and we see no reason why it should not continue to do so. It is extremely simple requiring practically no attention whatever, which of course is highly desirable owing to the vibrations and severe shocks which it has to withstand during the operation of the shovel.

Yours truly,

CORONA COAL COMPANY

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